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CLUSTER II OBSERVATIONS OF THE MAGNETOSPHERIC CUSP

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In July and August of 2000, the European Space Agency (ESA) launched the Cluster II spacecraft, there by ushering in a new era in the exploration of the earth's magnetosphere. The four spacecraft, (Tango, Rumba, Samba, and Salsa) are traveling in a tetrahedral formation along a polar orbit trajectory that takes them into regions that have been relatively unexplored by previous missions. The use of four spacecraft allows researchers to use cross correlation techniques to distinguish between temporal and spatial evolution of structures in the magnetosphere for the first time.

Each of the four spacecraft carries a suite of 11 identical instruments that measure all of the relevant plasma and field properties of the space environment. These instruments include: the Spatio-Temporal Analysis of Field Fluctuations (STAFF) experiment, the Electrical Field and Wave experiment (EFW), the Digital Wave-Processing experiment (DWP), the Waves of High Frequency and Sounder for Probing of Density by Relaxation experiment (WHISPER), the Wideband Data instrument (WBD), the Fluxgate Magnetometer (FGM), the Electron Drift Instrument (EDI), the Active Spacecraft Potential Control experiment (ASPOC), the Plasma Electron and Current Analyzer (PEACE), the Cluster Ion Spectrometry Experiment (CIS), and finally, Research with Adaptive Particle Imaging Detectors (RAPID).

Of particular interest for this presentation are the Cluster encounters with the cusp, a region that is believed to play an important role as an entry region for solar wind particles into the magnetosphere. From early February to late March, the Cluster orbit is aligned so that the four spacecraft tend to fly through the center of the cusp. During this period in 2001, the average spacecraft separation was approximately 600 km, and we found ample evidence both for structures that were much larger than this scale and also for smaller scale structures. For 2002, the average spacecraft separation was reduced to 100 km in order to study the smaller scale structures. We present data from the Cluster encounters with the cusp during periods when the interplanetary magnetic field (IMF) is pointing north. We first show single spacecraft data from multiple instruments to demonstrate the basic characteristics of the cusp (e.g. plasma composition, flows, fluctuation levels, etc.). Following this we will show examples of how using

multi-satellite data we can identify the motion and structures of various boundary layers and waves.